REMARKS

This response is submitted in reply to the Office Action dated January 30, 2007, issued in connection with the above-identified application. Claims 1, 3-9 and 11-16 are pending in the patent application, with Claims 4-8 and 12-16 being withdrawn. In the final Office Action, Claims 1, 3, 9 and 11 are rejected under 35 U.S.C. §103. In response, Applicants have amended claims 1 and 9 and added claims 17 and 18. In view of the amendments and for the reasons set forth below, Applicants respectfully disagree and traverse this rejection. The commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing.

Claims 1, 3, 9 and 11 have been rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent No. 6,632,566 ("*Yamada*") in view of U.S. Patent No. 6,455,202 ("*Marugan*") and/or in view of U.S. Patent No. 5,631,100 ("*Yoshino*"). With respect to the pending claims, Applicants believe that this rejection should be withdrawn.

Amended independent claims 1 and 9 recite, in part, a cathode mixture layer including a cathode active material and a binder, the binder including styrene butadiene latex adhesive and a thickener wherein the content of the styrene butadiene latex adhesive in the cathode mixture layer ranges from about 2 wt% to about 4 wt%, and the content of the thickener in the cathode mixture layer ranges from about 0.5 wt% to about 2.5 wt%, wherein the cathode active material includes a lithium iron phosphorous oxide that has an olivine structure. The amendment is supported in the specification at page 6, lines 9-10. Applicants respectfully submit that the cited references fail to disclose all the elements of the claims and, moreover, question whether the cited references can be properly combined/modified to allegedly cover the claimed invention in the first place.

For example, *Yamada* fails to disclose or suggest a binder including styrene butadiene latex adhesive and a thickener wherein the content of the styrene butadiene latex adhesive in the cathode mixture layer ranges from about 2 wt% to about 4 wt%, and the content of the thickener in the cathode mixture layer ranges from about 0.5 wt% to about 2.5 wt%. The Office Action admits the same on page 3, line 3.

Further, neither *Marugan* nor *Yoshino* disclose or suggest the above. *Marugan* discloses examples of elastomers used, but not examples of elastomer latexes. See, *Marugan*, column 2, lines 47-67. Moreover, none of the examples use any form of styrene butadiene elastomer or

styrene butadiene latex. Rather, the examples use a copolymer of acrylonitrile and butadiene (NPR) or a polyvinylidene fluoride (PVDF). See, *Marugan*, Table 2.

With regard to *Yoshino*, the reference fails to disclose the stated range of styrene butadiene latex adhesive as claimed. Rather, *Yoshino* states that the binder amount is not particularly limited, but is generally from 0.1-20 wt% and preferably from 0.5-10 wt%. Indeed, *Yoshino* further states that a latex amount less that 0.1 wt% results in poor adhesion strength. See, *Yoshino*, column 7, line 62 to column 8, line 1. Consequently, the *Yoshino* teaching suggests that a latex amount between 0.1-2 wt% results in sufficient adhesion strength. By contrast, Applicants have demonstrated that a latex content below 2% results in insufficient strength. See, Specification, page 6, line 20-30 and Table 1.

For thickener amount, *Yoshino* discloses, as noted in the Office Action, that a thickener can be added at 2-60 wt% per 100 wt% of the solid value of the styrene-butadiene latex. However, Applicants believe this teaching still fails to disclose or suggest an about 0.5-2.5 wt% thickener amount in the cathode mixture. Even if *Yoshino's* range arguably encompasses Applicants' claimed range, *Yoshino* still teaches away from Applicants claims for the same reasons as the claimed latex range. While *Yoshino* discloses a 2-60% thickener range, Applicants teach that any thickener amount above 2.5 wt% results in a cathode mixture that is impossible to apply. See, Specification, page 6, lines 30-32, and Table 2.

Clearly, this suggests that Applicants have demonstrated unexpected results with respect to the claimed styrene-butadiene latex and thickener ranges not recognized by the cited art of record. Again, *Yamada* fails to teach the binder and thickener as claimed and even admitted by the Patent Office as discussed above. With respect to *Marugan* and *Yoshino*, indeed, these references relate to cathode active materials different from the claimed lithium iron phosphorous oxide that includes an olivine structure. As previously discussed, both *Marugan* and *Yoshino* are directed to cathode active materials without phosphorous, such as lithium cobalt oxides and lithium manganese oxides. See, *Marugan*, Table 2, and *Yoshino*, column 3, lines 22-39.

This difference is significant. Applicants have recognized many problems with the use of certain active materials such as, lithium cobalt oxides. For example, with these types of active materials, in order to improve the load characteristics, it is necessary to smooth an electrode into a thin film. To do so, it is necessary to downsize grain diameters of the active materials to improve conductivity. However, when downsizing, specific surface area becomes large. Thus,

unless more binder is added, the electrode becomes fragile, and sufficient peel strength cannot be obtained. See, Specification, page 1, line 24 to page 2, line 4. Similar problems exist related to charge and discharge cycle characteristics and safety.

As a result of the problems discussed above and various experiments related to cathode active materials and binders (latex adhesives and thickeners included), Applicants found that a lithium phosphorus oxide containing, for example, an olivine structure provided a sufficient grain diameter such that the material could still be downsized to obtain a flexible and smooth cathode without increasing the ratio of binder. Moreover, by adding a synthetic rubber latex combined with a thickener (e.g., polyacrylic acid as further recited in clams 17 and 18) to the mixture containing lithium phosphorus oxide, the flexible and smooth cathode could be maintained while also reducing the amount of binder needed compared to conventional cases. See. Specification, page 2, lines 1-8. Therefore, Applicants believe that the cited art is distinguished from the claimed invention for at least these reasons.

Further, Applicants question whether the cited art can even be combined in the first place. *Yamada* is primarily relied on for its alleged teaching regarding a positive electrode containing a lithium phosphorous oxide. As previously discussed, both *Marugan* and *Yoshino* are directed to cathode active materials without phosphorous, such as lithium cobalt oxides and lithium manganese oxides. This difference in active materials is significant as Applicants have recognized and as discussed above. Therefore, Applicants believe that the alleged combinability/modification of the cited art to arrived to the claimed invention is improperly based on hindsight reasoning.

Accordingly, Applicants respectfully request that the obviousness rejection be withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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